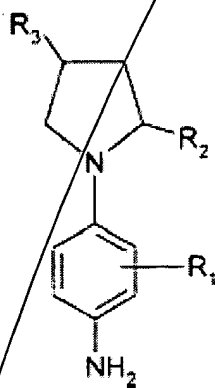


WHAT IS CLAIMED IS:

1. A composition for oxidation dyeing keratinous fibers comprising, in a medium suitable for dyeing:

(iii) at least one oxidation dye precursor chosen from 1-(4-aminophenyl)-pyrrolidines of formula (I) and acid addition salts thereof:



(I)

wherein:

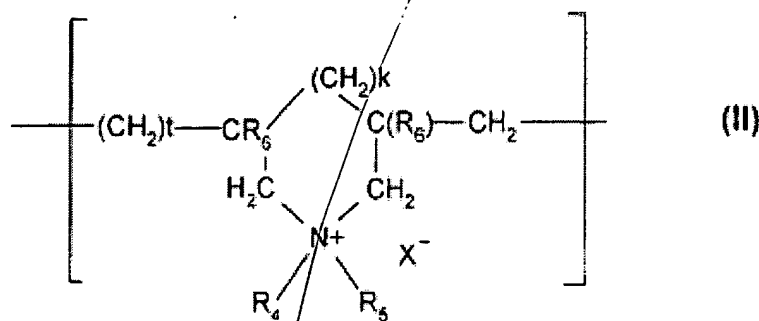
- R<sub>1</sub> is chosen from a hydrogen atom, C<sub>1</sub>-C<sub>6</sub> alkyl groups, C<sub>1</sub>-C<sub>5</sub> monohydroxyalkyl groups, and C<sub>2</sub>-C<sub>5</sub> polyhydroxyalkyl groups,
- R<sub>2</sub> is chosen from a hydrogen atom, a -CONH<sub>2</sub> group, C<sub>1</sub>-C<sub>5</sub> monohydroxyalkyl groups, and C<sub>2</sub>-C<sub>5</sub> polyhydroxyalkyl groups, and
- R<sub>3</sub> is chosen from a hydrogen atom, and a hydroxyl group, and

(ii) at least one cationic polymer chosen from:

(1) homopolymers and copolymers comprising, as a constituent of the chain, at



least one unit chosen from units formula (II):

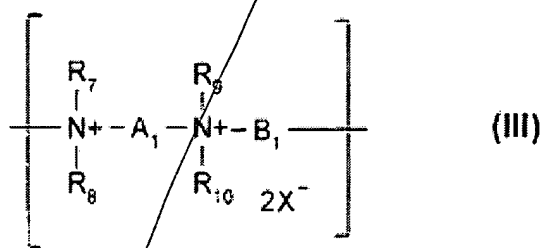


wherein:

- k and t, which are identical or different, are each chosen from 0 and 1, provided that the sum of k + t is equal to 1,
- R<sub>4</sub> and R<sub>5</sub>, which are identical or different, are each chosen from (C<sub>1</sub>-C<sub>22</sub>) alkyl groups, (C<sub>1</sub>-C<sub>5</sub>)-hydroxyalkyl groups, and (C<sub>1</sub>-C<sub>4</sub>)amidoalkyl groups,
- R<sub>4</sub> and R<sub>5</sub>, together with the nitrogen cation to which they are commonly bonded, optionally form a cationic heterocyclic group chosen from a piperidinyll group and a morpholinyl group,
- R<sub>6</sub>, which are identical or different, are each chosen from a hydrogen atom and a methyl group, and
- X<sup>-</sup> is an anion;

(2) quaternary diammonium polymers comprising repeating units of formula (III):





wherein:

- $R_7$ ,  $R_8$ ,  $R_9$ , and  $R_{10}$ , which are identical or different, are each chosen from  $C_1$ - $C_{20}$  aliphatic groups,  $C_3$ - $C_{20}$  alicyclic groups,  $C_7$ - $C_{20}$  arylaliphatic groups, and lower hydroxyalkyl groups,
- at least two of said  $R_7$ , said  $R_8$ , said  $R_9$ , and said  $R_{10}$ , together with the nitrogen cations to which they are attached, optionally form at least one cationic heterocyclic ring optionally comprising an additional heteroatom other than nitrogen,
- $R_7$ ,  $R_8$ ,  $R_9$ , and  $R_{10}$ , which are identical or different, are each optionally chosen from linear and branched  $C_1$ - $C_6$  alkyl groups substituted with at least one group chosen from nitrile groups, ester groups, acyl groups, amide groups,  $-\text{CO}-\text{O}-R_{11}-\text{D}$  groups, and  $-\text{CO}-\text{NH}-R_{11}-\text{D}$  groups, wherein  $R_{11}$  is chosen from alkylene groups and D is chosen from quaternary ammonium groups,
- $A_1$  and  $B_1$ , which are identical or different, are each chosen from linear and branched, saturated and unsaturated,  $C_2$ - $C_{20}$  polymethylene groups, optionally comprising at least one entity chosen from aromatic rings,



an oxygen atom, a sulfur atom, a sulfoxide group, a sulfone group, a disulfide group, an amino group, alkylamino groups, a hydroxyl group, quaternary ammonium groups, a ureido group, an amide group, and ester groups, wherein said at least one entity is linked to or intercalated in the main chain,

- $X^-$  is an anion,
- said  $A_1$ , said  $R_7$ , and said  $R_9$  optionally form a piperazine ring, together with the two nitrogen cations to which they are attached, and
- provided that if  $A_1$  is chosen from linear and branched, saturated and unsaturated,  $C_2$ - $C_{20}$  polymethylene groups and linear and branched, saturated and unsaturated, hydroxy( $C_2$ - $C_{20}$ )polymethylene groups,  $B_1$  is chosen from

$-(CH_2)_n-CO-D-OC-(CH_2)_n-$  groups, wherein:

- $n$  is an integer ranging from 1 to 100,
- $D$  is chosen from:

a) glycol residues of formula:  $-O-Z-O-$ , wherein  $Z$  is chosen from linear and branched hydrocarbon groups and groups chosen from groups of formulae:

$-(CH_2-CH_2-O)_x-CH_2-CH_2-$  and

$-[CH_2-CH(CH_3)-O]_y-CH_2-CH(CH_3)-$

wherein  $x$  and  $y$ , which are identical or different, are each chosen from integers ranging from 1 to 4 (in which case  $x$  and  $y$  represent a defined and unique degree of polymerization) and



any number ranging from 1 to 4 (in which case x and y represent an average degree of polymerization),

b) bis-secondary diamine residues,

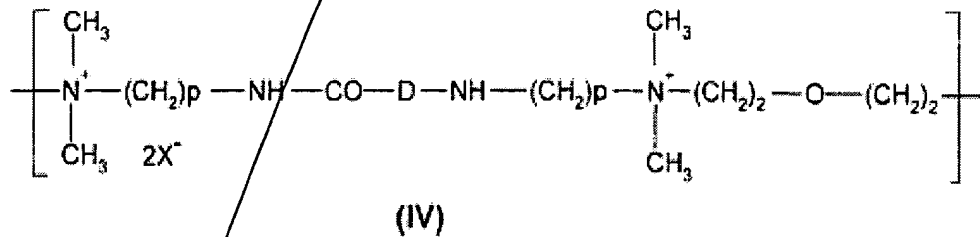
c) bis-primary diamine residues chosen from residues of formula:

-NH-Y-NH-, wherein Y is chosen from linear and branched hydrocarbon groups and residues of formula

-CH<sub>2</sub>-CH<sub>2</sub>-S-S-CH<sub>2</sub>-CH<sub>2</sub>-, and

d) a ureylene group of formula: -NH-CO-NH-;

(3) quaternary diammonium polymers comprising repeating units of formula (IV):



wherein:

- p is an integer ranging from 1 to 6,

- D is chosen from a direct bond and -(CH<sub>2</sub>)<sub>r</sub>-CO- groups, wherein r is a number equal to 4 or 7, and

- X<sup>-</sup> is an anion;

(4) amine-containing silicones.

2. A composition according to claim 1, wherein said keratinous fibers are human keratinous fibers.



3. A composition according to claim 2, wherein said human keratinous fibers are human hair.

4. A composition according to claim 1, wherein said n of said  $-(CH_2)_n-CO-D-OC-(CH_2)_n-$  groups is an integer ranging from 1 to 50.

5. A composition according to claim 1, wherein said  $R_1$ , said  $R_2$ , and said  $R_3$  are each a hydrogen atom.

6. A composition according to claim 1, wherein said  $R_1$  and said  $R_3$  are each a hydrogen atom and said  $R_2$  is a  $-CH_2OH$  group.

7. A composition according to claim 1, wherein said  $R_1$  is a hydrogen atom, said  $R_2$  is a  $-CH_2OH$  group, and said  $R_3$  is a hydroxyl group.

8. A composition according to claim 1, wherein said  $R_1$  and said  $R_3$  are each a hydrogen atom and said  $R_2$  is a  $-CONH_2$  group.

9. A composition according to claim 1, wherein said acid addition salts of said 1-(4-aminophenyl)pyrrolidines of formula (I) are chosen from hydrochlorides, hydrobromides, sulphates, tartrates, lactates, and acetates.

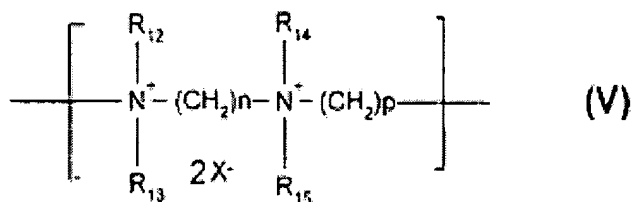
10. A composition according to claim 1, wherein said at least one oxidation dye precursor is present in said composition in an amount ranging from 0.001% to 10% by weight relative to the total weight of the composition.

11. A composition according to claim 10, wherein said at least one oxidation dye precursor is present in said composition in an amount ranging from 0.01% to 8% by weight relative to the total weight of the composition.

12. A composition according to claim 1, wherein said quaternary diammonium polymers comprising repeating units of formula (III) are chosen from cationic polymers



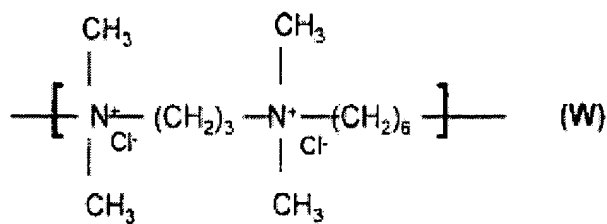
comprising repeating units of formula (V):



wherein

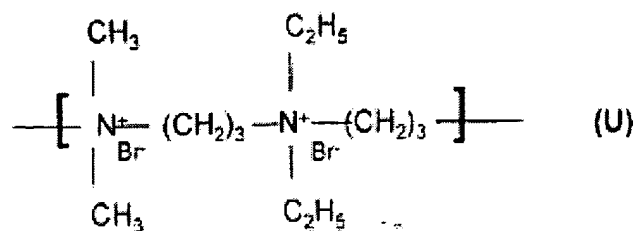
- $R_{12}$ ,  $R_{13}$ ,  $R_{14}$ , and  $R_{15}$ , which are identical or different, are each chosen from  $C_1$ - $C_4$  alkyl groups and  $C_1$ - $C_4$  hydroxyalkyl groups, and
- $n$  and  $p$  are each chosen from integers ranging from 2 to 20, and
- $X^-$  is an anion.

13. A composition according to claim 12, wherein said cationic polymers comprising repeating units of formula (V) are chosen from cationic polymers comprising repeating units of formula (W):



14. A composition according to claim 12, wherein said cationic polymers comprising repeating units of formula (V) are chosen from cationic polymers comprising repeating units of formula (U):





15. A composition according to claim 1, wherein said at least one cationic polymer is chosen from quaternary diammonium polymers comprising repeating units of formula (IV), wherein:

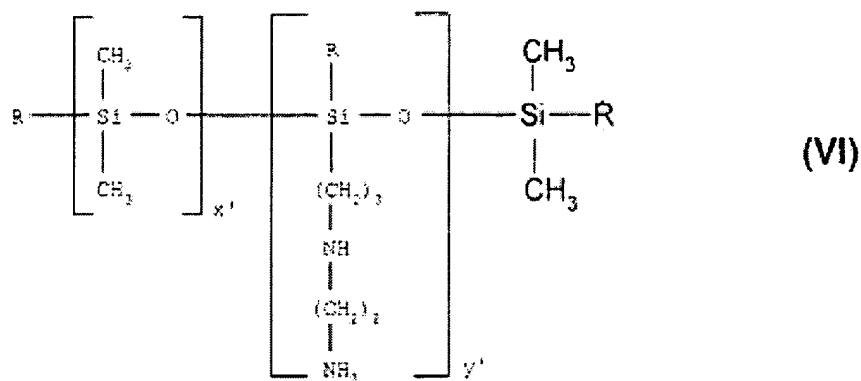
- p is chosen from integers ranging from 1 to 6,
- D is chosen from a direct bond and  $-(\text{CH}_2)_r\text{-CO-}$  groups, wherein r is a number equal to 4 or 7, and
- $\text{X}^-$  is an anion chosen from anions derived from inorganic acids and anions derived from organic acids.

16. A composition according to claim 15, wherein said p is equal to 3, said D is a direct bond, and said  $\text{X}^-$  is a chlorine anion.

17. A composition according to claim 1, wherein said at least one amine-containing silicone is chosen from:

- (i) polysiloxanes of formula (VI):

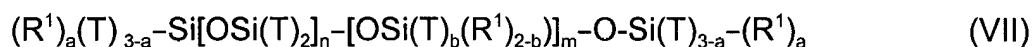




wherein:

- R is a group chosen from a methyl group and a hydroxyl group, and
- x' and y' are integers chosen such that the weight-average molecular weight of said polysiloxane ranges from 5,000 to 500,000;

(ii) aminosilicones of formula (VII):

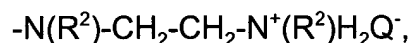
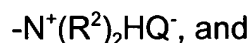
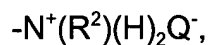
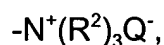
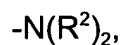
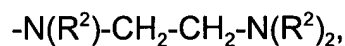


wherein:

- T is chosen from a hydrogen atom, a phenyl group, a hydroxyl group, and (C<sub>1</sub>-C<sub>8</sub>) alkyl groups,
- a is an integer ranging from 0 to 3,
- b is chosen from 0 and 1,
- m and n are numbers such that the sum (n + m) ranges from 1 to 2,000,



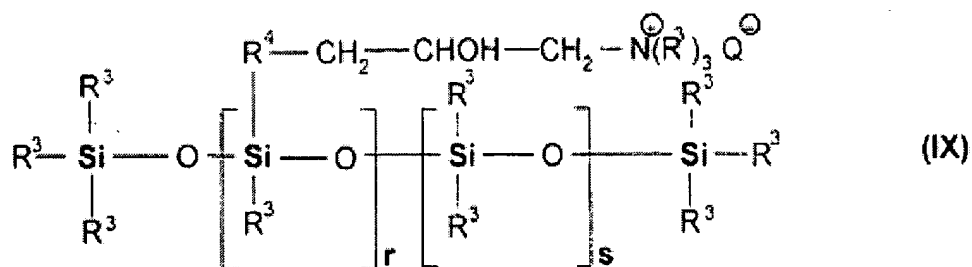
- n is chosen from a number ranging from 0 to 1,999,
- m is chosen from a number ranging from 1 to 2,000,
- R<sup>1</sup> is a monovalent group of formula -C<sub>q</sub>H<sub>2q</sub>L, wherein q is chosen from a number ranging from 2 to 8, and wherein L is an optionally quaternized amine group chosen from:



wherein

- R<sup>2</sup>, which are identical or different, are each chosen from a hydrogen atom, a phenyl group, a benzyl group, and (C<sub>1</sub>-C<sub>20</sub>) alkyl groups, and
- Q<sup>-</sup> is chosen from halide anions;

(iii) aminosilicones of formula (IX):

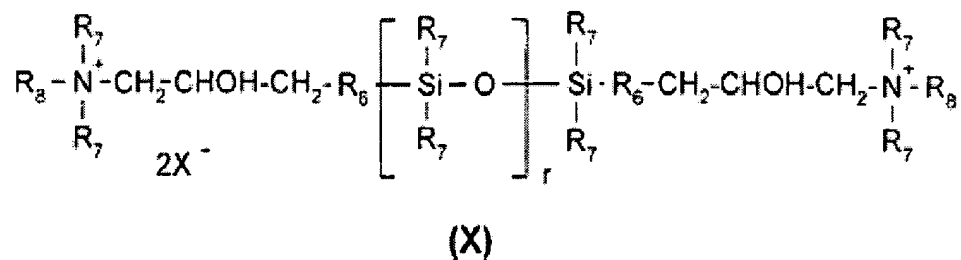


wherein:



- $R^3$ , which are identical or different, are each chosen from  $(C_1-C_{18})$  alkyl groups and  $(C_2-C_{18})$  alkenyl groups,
- $R_4$  is chosen from divalent  $(C_1-C_{18})$  alkylene groups, and divalent  $(C_1-C_{18})$  alkyleneoxy groups,
- $Q^-$  is chosen from halide anions,
- $r$  is a mean statistical value ranging from 2 to 20, and
- $s$  is a mean statistical value ranging from 20 to 200;

(iv) silicones of formula (X):



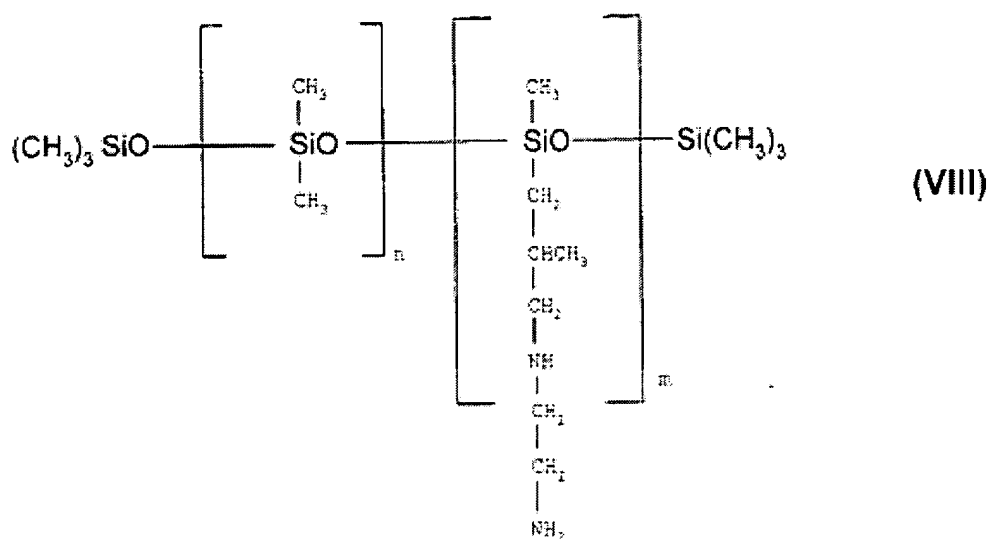
wherein:

- $R_6$  is chosen from divalent  $(C_1-C_{18})$  alkylene groups, and divalent  $(C_1-C_{18})$  alkyleneoxy groups, wherein said  $R_6$  is bonded to the Si by way of an SiC bond,
- $R_7$ , which are identical or different, are each chosen from  $(C_1-C_{18})$  monovalent hydrocarbon-based groups,  $(C_2-C_{18})$  alkenyl groups, and  $(C_5-C_6)$  rings,
- $R_8$ , which are identical or different, are each chosen from a hydrogen atom,  $(C_1-C_{18})$  monovalent hydrocarbon-based groups,  $(C_2-C_{18})$  alkenyl groups, and  $-R_6-NHCOR_7$  groups, wherein said  $R_6$  and said  $R_7$  are defined above,



- r is a mean statistical value ranging from 2 to 200, and
- X<sup>-</sup> is an anion.

18. A composition according to claim 1, wherein said at least one cationic polymer is chosen from trimethylsilylamodimethicones of formula (VIII):

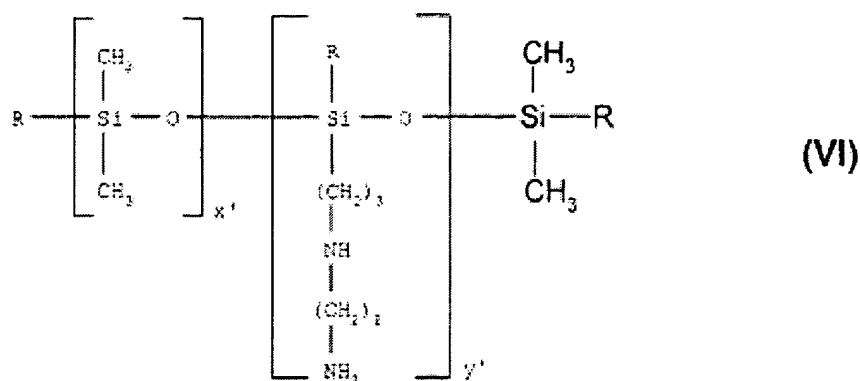


wherein:

- m and n are numbers such that the sum (n + m) ranges from 1 to 2,000,
- n is chosen from a number ranging from 0 to 1,999, and
- m is chosen from a number ranging from 1 to 2,000.

19. A composition according to claim 1, wherein said at least one cationic polymer is chosen from polysiloxanes of formula (VI):





wherein:

- R is a group chosen from a methyl group and a hydroxyl group, and
- x' and y' are integers chosen such that the weight-average molecular weight of said polysiloxane ranges from 5,000 to 500,000;

and wherein said composition further comprises:

- (i) trimethylcetylammmonium chloride, and
- (ii) at least one compound of formula:  $\text{C}_{13}\text{H}_{27}-(\text{OC}_2\text{H}_4)_{12}-\text{OH}$ .

20. A composition according to claim 18, wherein said composition further comprises:

- (i) at least one nonionic surfactant of formula:  $\text{C}_8\text{H}_{17}-\text{C}_6\text{H}_4-(\text{OCH}_2\text{CH}_2)_{40}-\text{OH}$ ,
- (ii) at least one nonionic surfactant of formula:  $\text{C}_{12}\text{H}_{25}-(\text{OCH}_2-\text{CH}_2)_6-\text{OH}$ , and
- (iii) propylene glycol.

21. A composition according to claim 1, wherein said at least one cationic polymer is present in said composition in an amount ranging from 0.01% to 10% by weight relative to the total weight of the composition.



22. A composition according to claim 21, wherein said at least one cationic polymer is present in said composition in an amount ranging from 0.05% to 5% by weight relative to the total weight of the composition.

23. A composition according to claim 22, wherein said at least one cationic polymer is present in said composition in an amount ranging from 0.1% to 3% by weight relative to the total weight of the composition.

24. A composition according to claim 1 further comprising at least one coupler.

25. A composition according to claim 24, wherein said at least one coupler is chosen from meta-phenylenediamines, meta-aminophenols, meta-diphenols, naphthols, heterocyclic couplers, and acid addition salts of any of the foregoing compounds.

26. A composition according to claim 24, wherein said at least one coupler is chosen from 2,4-diamino-1-( $\beta$ -hydroxyethyloxy)benzene, 2-methyl-5-aminophenol, 5-N-( $\beta$ -hydroxyethyl) amino-2-methylphenol, 3-aminophenol, 1,3-dihydroxybenzene, 1,3-dihydroxy-2-methylbenzene, 4-chloro-1,3-dihydroxy-benzene, 2-amino-4-( $\beta$ -hydroxyethylamino)-1-methoxy-benzene, 1,3-diaminobenzene, 1,3-bis(2,4-diaminophenoxy)propane, sesamol, 1-amino-2-methoxy-4,5-methylenedioxybenzene,  $\alpha$ -naphthol, 6-hydroxyindole, 4-hydroxyindole, 4-hydroxy-N-methylindole, 6-hydroxy-indoline, 2,6-dihydroxy-4-methylpyridine, 1-H-3-methyl-pyrazol-5-one, 1-phenyl-3-methylpyrazol-5-one, 2-amino-3-hydroxypyridine, 3,6-dimethylpyrazolo[3,2-c]-1,2,4-triazole, 2,6-dimethylpyrazolo[1,5-b]-1,2,4-triazole and acid addition salts of any of the foregoing compounds.

27. A composition according to claim 24, wherein said at least one coupler is present in said composition in an amount ranging from 0.0001% to 15% by weight relative



to the total weight of the composition.

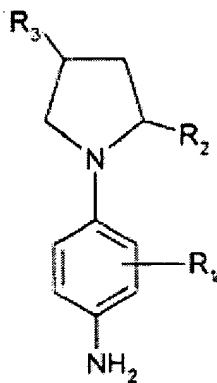
28. A composition according to claim 1 further comprising at least one oxidation base, other than said at least one oxidation dye precursor, in an amount ranging from 0.0001% to 15% by weight relative to the total weight of said composition.

29. A composition according to claim 1 further comprising at least one direct dye in an amount ranging from 0.001% to 20% by weight relative to the total weight of said composition.

30. A composition according to claim 1 further comprising at least one agent chosen from reducing agents and antioxidants, wherein said at least one agent is present in said composition in an amount ranging from 0.05% to 1.5% by weight relative to the total weight of said composition.

31. A composition for oxidation dyeing keratinous fibers comprising, in a medium suitable for dyeing:

- (i) at least one oxidation dye precursor chosen from 1-(4-aminophenyl)-pyrrolidines of formula (I) and acid addition salts thereof:



(I)

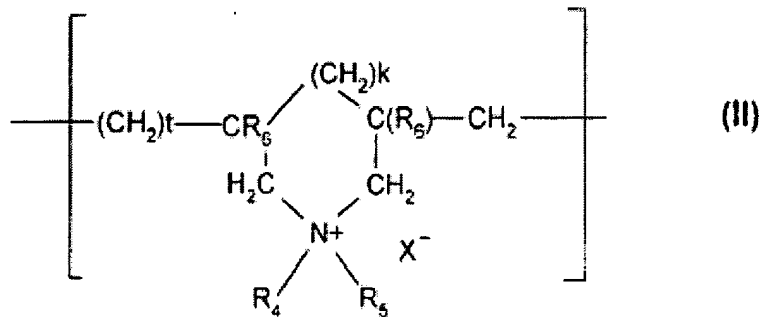


wherein:

- $R_1$  is chosen from a hydrogen atom,  $C_1$ - $C_6$  alkyl groups,  $C_1$ - $C_5$  monohydroxyalkyl groups, and  $C_2$ - $C_5$  polyhydroxyalkyl groups,
- $R_2$  is chosen from a hydrogen atom, a  $-\text{CONH}_2$  group,  $C_1$ - $C_5$  monohydroxyalkyl groups, and  $C_2$ - $C_5$  polyhydroxyalkyl groups, and
- $R_3$  is chosen from a hydrogen atom, and a hydroxyl group, and

(ii) at least one cationic polymer chosen from:

- (1) homopolymers and copolymers comprising, as a constituent of the chain, at least one unit chosen from units formula (II):



wherein:

- $k$  and  $t$ , which are identical or different, are each chosen from 0 and 1, provided that the sum of  $k + t$  is equal to 1,
- $R_4$  and  $R_5$ , which are identical or different, are each chosen from  $(C_1$ - $C_{22})$  alkyl groups,  $(C_1$ - $C_5)$ -hydroxyalkyl groups, and  $(C_1$ - $C_4)$ amidoalkyl groups,



- $$\left[ \begin{array}{c} R_7 \\ | \\ -N^+-A_1- \\ | \\ R_8 \end{array} - \begin{array}{c} R_9 \\ | \\ -N^+-B_1- \\ | \\ R_{10} \end{array} \right] 2X^- \quad (III)$$

- R<sub>7</sub>, R<sub>8</sub>, R<sub>9</sub>, and R<sub>10</sub>, which are identical or different, are each chosen from C<sub>1</sub>-C<sub>20</sub> aliphatic groups, C<sub>3</sub>-C<sub>20</sub> alicyclic groups, C<sub>7</sub>-C<sub>20</sub> arylaliphatic groups, and lower hydroxyalkyl groups,
- at least two of said R<sub>7</sub>, said R<sub>8</sub>, said R<sub>9</sub>, and said R<sub>10</sub>, together with the nitrogen cations to which they are attached, optionally form at least one cationic heterocyclic ring optionally comprising an additional heteroatom other than nitrogen,
- R<sub>7</sub>, R<sub>8</sub>, R<sub>9</sub>, and R<sub>10</sub>, which are identical or different, optionally are each

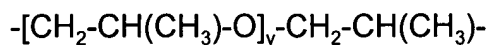
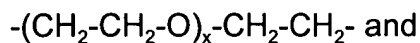


chosen from linear and branched  $C_1$ - $C_6$  alkyl groups substituted with at least one group chosen from nitrile groups, ester groups, acyl groups, amide groups,  $-CO-O-R_{11}-D$  groups, and  $-CO-NH-R_{11}-D$  groups, wherein  $R_{11}$  is chosen from alkylene groups and D is chosen from quaternary ammonium groups,

- $A_1$  and  $B_1$ , which are identical or different, are each chosen from linear and branched, saturated and unsaturated,  $C_2$ - $C_{20}$  polymethylene groups, optionally comprising at least one entity chosen from aromatic rings, an oxygen atom, a sulfur atom, a sulfoxide group, a sulfone group, a disulfide group, an amino group, alkylamino groups, a hydroxyl group, quaternary ammonium groups, a ureido group, an amide group, and ester groups, wherein said at least one entity is linked to or intercalated in the main chain,
- $X^-$  is an anion,
- said  $A_1$ , said  $R_7$ , and said  $R_9$  optionally form a piperazine ring, together with the two nitrogen cations to which they are attached, and
- provided that if  $A_1$  is chosen from linear and branched, saturated and unsaturated,  $C_2$ - $C_{20}$  polymethylene groups and linear and branched, saturated and unsaturated, hydroxy( $C_2$ - $C_{20}$ )polymethylene groups,  $B_1$  is additionally chosen from  $-(CH_2)_n-CO-D-OC-(CH_2)_n-$  groups, wherein:
  - n is an integer ranging from 1 to 100, and
  - D is chosen from:
    - a) glycol residues of formula:  $-O-Z-O-$ , wherein Z is chosen from linear



and branched hydrocarbon groups and groups chosen from groups of formulae:

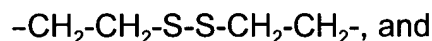


wherein x and y, which are identical or different, are each chosen from integers ranging from 1 to 4 (in which case x and y represent a defined and unique degree of polymerization) and any number ranging from 1 to 4 (in which case x and y represent an average degree of polymerization),

b) bis-secondary diamine residues,

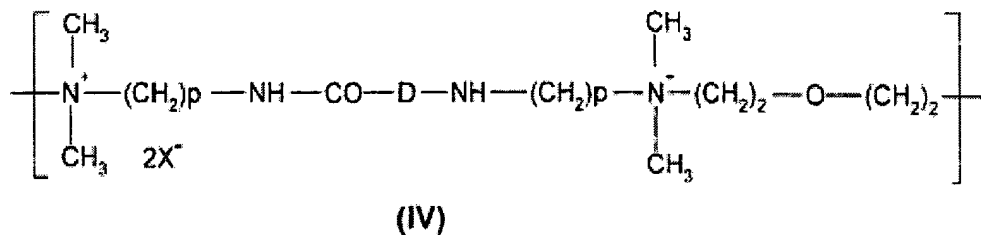
c) bis-primary diamine residues chosen from residues of formula:

$-\text{NH}-\text{Y}-\text{NH}-$ , wherein Y is chosen from linear and branched hydrocarbon groups and residues of formula



d) a ureylene group of formula:  $-\text{NH}-\text{CO}-\text{NH}-$ ;

(3) quaternary diammonium polymers comprising repeating units of formula (IV):



wherein:



- p is an integer ranging from 1 to 6,
- D is chosen from a direct bond and  $-(CH_2)_r-CO-$  groups, wherein r is a number equal to 4 or 7, and
- $X^-$  is an anion;

- (4) amine-containing silicones, and
- (iii) at least one oxidizing agent.

32. A composition according to claim 31, wherein said at least one oxidizing agent is chosen from hydrogen peroxide, urea peroxide, alkali metal bromates, alkali metal ferricyanides, persalts, and oxidation-reduction enzymes

33. A composition according to claim 32, wherein said at least one oxidizing agent is chosen from laccases, peroxidases and 2-electron oxidoreductases, where appropriate in the presence of their respective donor or cofactor.

34. A composition according to claim 32, wherein said at least one oxidizing agent is hydrogen peroxide.

35. A composition according to claim 32, wherein said at least one oxidizing agent comprises a solution of hydrogen peroxide with a titre ranging from 1 to 40 in volume.

36. A composition according to claim 1, wherein said composition for oxidation dyeing keratinous fibers has a pH ranging from 3 to 12.

37. A composition according to claim 31, wherein said composition for oxidation dyeing keratinous fibers has a pH ranging from 3 to 12.

38. A composition according to claim 31 further comprising at least one surfactant chosen from anionic surfactants, cationic surfactants, nonionic surfactants, and



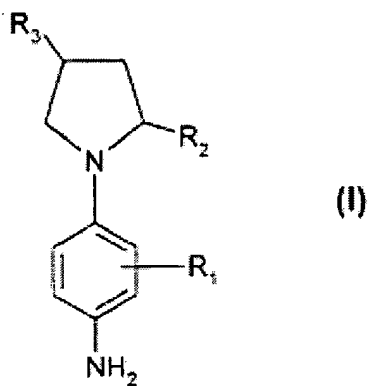
amphoteric surfactants.

39. A composition according to claim 38, wherein said at least one surfactant is present in said composition in an amount ranging from 0.1% to 20% by weight relative to the total weight of said composition.

40. A method for oxidation dyeing keratinous fibers comprising:

(A) applying to said fibers at least one dyeing composition comprising, in a medium suitable for dyeing:

(i) at least one oxidation dye precursor chosen from 1-(4-aminophenyl)-pyrrolidines of formula (I) and acid addition salts thereof:



wherein:

- R<sub>1</sub> is chosen from a hydrogen atom, C<sub>1</sub>-C<sub>6</sub> alkyl groups, C<sub>1</sub>-C<sub>5</sub> monohydroxyalkyl groups, and C<sub>2</sub>-C<sub>5</sub> polyhydroxyalkyl groups,
- R<sub>2</sub> is chosen from a hydrogen atom, a -CONH<sub>2</sub> group, C<sub>1</sub>-C<sub>5</sub> monohydroxyalkyl



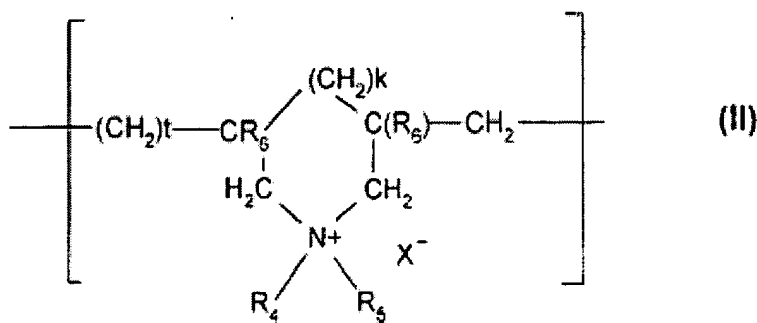
groups, and C<sub>2</sub>-C<sub>5</sub> polyhydroxyalkyl groups, and

- R<sub>3</sub> is chosen from a hydrogen atom, and a hydroxyl group,

and optionally comprising:

(ii) at least one cationic polymer chosen from:

(1) homopolymers and copolymers comprising, as a constituent of the chain, at least one unit chosen from units formula (II):



wherein:

- k and t, which are identical or different, are each chosen from 0 and 1,

provided that the sum of k + t is equal to 1,

- R<sub>4</sub> and R<sub>5</sub>, which are identical or different, are each chosen from

(C<sub>1</sub>-C<sub>22</sub>) alkyl groups, (C<sub>1</sub>-C<sub>5</sub>)-hydroxyalkyl groups, and

(C<sub>1</sub>-C<sub>4</sub>)amidoalkyl groups,

- R<sub>4</sub> and R<sub>5</sub>, together with the nitrogen cation to which they are commonly

bonded, may optionally form a cationic heterocyclic group chosen from

a piperidiny group and a morpholiny group,

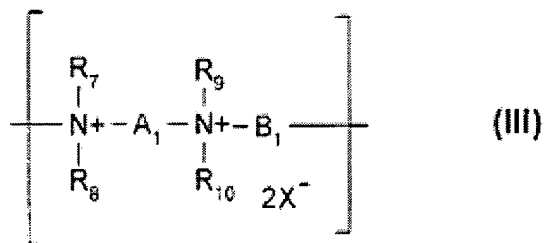
- R<sub>6</sub>, which are identical or different, are each chosen from a hydrogen atom



and a methyl group, and

-  $X^-$  is an anion;

(2) quaternary diammonium polymers comprising repeating units of formula (III):



wherein:

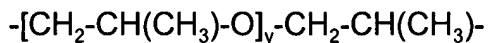
- $R_7$ ,  $R_8$ ,  $R_9$ , and  $R_{10}$ , which are identical or different, are each chosen from  $C_1$ - $C_{20}$  aliphatic groups,  $C_3$ - $C_{20}$  alicyclic groups,  $C_7$ - $C_{20}$  arylaliphatic groups, and lower hydroxyalkyl groups,
- at least two of said  $R_7$ , said  $R_8$ , said  $R_9$ , and said  $R_{10}$ , together with the nitrogen cations to which they are attached, optionally form at least one cationic heterocyclic ring optionally comprising an additional heteroatom other than nitrogen,
- $R_7$ ,  $R_8$ ,  $R_9$ , and  $R_{10}$ , which are identical or different, optionally are each chosen from linear and branched  $C_1$ - $C_6$  alkyl groups substituted with at least one group chosen from nitrile groups, ester groups, acyl groups, amide groups,  $-CO-O-R_{11}-D$  groups, and  $-CO-NH-R_{11}-D$  groups, wherein  $R_{11}$  is chosen from alkylene groups and  $D$  is chosen from



quaternary ammonium groups,

- $A_1$  and  $B_1$ , which are identical or different, are each chosen from linear and branched, saturated and unsaturated,  $C_2$ - $C_{20}$  polymethylene groups, optionally comprising at least one entity chosen from aromatic rings, an oxygen atom, a sulfur atom, a sulfoxide group, a sulfone group, a disulfide group, an amino group, alkylamino groups, a hydroxyl group, quaternary ammonium groups, a ureido group, an amide group, and ester groups, wherein said at least one entity is linked to or intercalated in the main chain,
- $X^-$  is an anion,
- said  $A_1$ , said  $R_7$ , and said  $R_9$  optionally form a piperazine ring, together with the two nitrogen cations to which they are attached, and
- provided that if  $A_1$  is chosen from linear and branched, saturated and unsaturated,  $C_2$ - $C_{20}$  polymethylene groups and linear and branched, saturated and unsaturated, hydroxy( $C_2$ - $C_{20}$ )polymethylene groups,  $B_1$  is additionally chosen from
  - $(CH_2)_n$ -CO-D-OC- $(CH_2)_n$ - groups, wherein:
    - $n$  is an integer ranging from 1 to 100, and
    - D is chosen from:
      - a) glycol residues of formula: -O-Z-O-, wherein Z is chosen from linear and branched hydrocarbon groups and groups chosen from groups of formulae:
        - $(CH_2-CH_2-O)_x-CH_2-CH_2-$  and



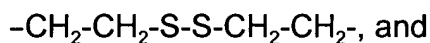


wherein x and y, which are identical or different, are each chosen from integers ranging from 1 to 4 (in which case x and y represent a defined and unique degree of polymerization) and any number ranging from 1 to 4 (in which case x and y represent an average degree of polymerization),

b) bis-secondary diamine residues,

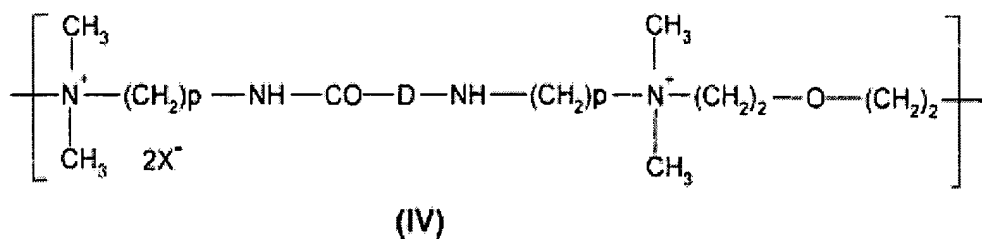
c) bis-primary diamine residues chosen from residues of formula:

-NH-Y-NH-, wherein Y is chosen from linear and branched hydrocarbon groups and residues of formula



d) a ureylene group of formula: -NH-CO-NH-;

(3) quaternary diammonium polymers comprising repeating units of formula (IV):



wherein:

- p is an integer ranging from 1 to 6,

- D is chosen from a direct bond and  $-(\text{CH}_2)_r-\text{CO}-$  groups, wherein r is a number equal to 4 or 7, and



- X<sup>-</sup> is an anion;

(4) amine-containing silicones, and

(B) developing a color by applying to said fibers at least one oxidizing composition comprising:

- at least one oxidizing agent and
- optionally comprising said at least one cationic polymer as defined above,
- wherein said at least one oxidizing composition is
  - applied to said fibers after combining, at the time of use, said at least one oxidizing composition with said at least one dyeing composition, or
  - applied to said fibers either simultaneously with or immediately after said at least one dyeing composition, without intermediate rinsing, and

(C) provided that said at least one cationic polymer is present in at least one of said at least one dyeing composition or said at least one oxidizing composition.

41. A method according to claim 40, wherein said keratinous fibers are human keratinous fibers.

42. A method according to claim 41, wherein said human keratinous fibers are human hair.

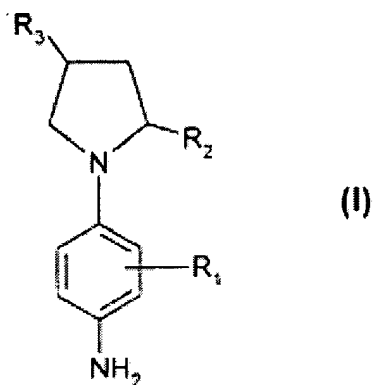
43. A method for oxidation dyeing keratinous fibers comprising:

(A) preparing at least one dyeing composition comprising, in a medium suitable for dyeing:

(i) at least one oxidation dye precursor chosen from 1-(4-aminophenyl)-pyrrolidines



of formula (I) and acid addition salts thereof:



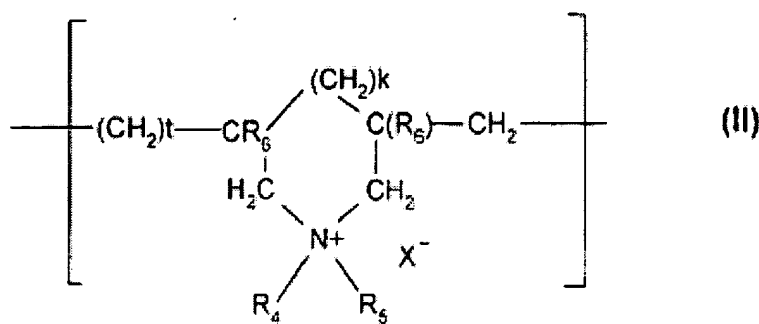
wherein:

- $R_1$  is chosen from a hydrogen atom,  $C_1$ - $C_6$  alkyl groups,  $C_1$ - $C_5$  monohydroxyalkyl groups, and  $C_2$ - $C_5$  polyhydroxyalkyl groups,
- $R_2$  is chosen from a hydrogen atom, a  $-CONH_2$  group,  $C_1$ - $C_5$  monohydroxyalkyl groups, and  $C_2$ - $C_5$  polyhydroxyalkyl groups, and
- $R_3$  is chosen from a hydrogen atom, and a hydroxyl group,

(ii) at least one cationic polymer chosen from:

- (1) homopolymers and copolymers comprising, as a constituent of the chain, at least one unit chosen from units formula (II):



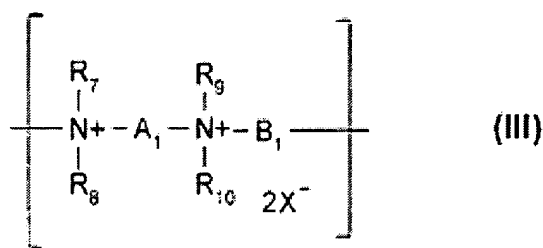


wherein:

- k and t, which are identical or different, are each chosen from 0 and 1, provided that the sum of k + t is equal to 1,
- R<sub>4</sub> and R<sub>5</sub>, which are identical or different, are each chosen from (C<sub>1</sub>-C<sub>22</sub>) alkyl groups, (C<sub>1</sub>-C<sub>5</sub>)-hydroxyalkyl groups, and (C<sub>1</sub>-C<sub>4</sub>)amidoalkyl groups,
- R<sub>4</sub> and R<sub>5</sub>, together with the nitrogen cation to which they are commonly bonded, may optionally form a cationic heterocyclic group chosen from a piperidinyl group and a morpholinyl group,
- R<sub>6</sub>, which are identical or different, are each chosen from a hydrogen atom and a methyl group, and
- X<sup>-</sup> is an anion;

(2) quaternary diammonium polymers comprising repeating units of formula (III):





wherein:

- $R_7$ ,  $R_8$ ,  $R_9$ , and  $R_{10}$ , which are identical or different, are each chosen from  $C_1$ - $C_{20}$  aliphatic groups,  $C_3$ - $C_{20}$  alicyclic groups,  $C_7$ - $C_{20}$  arylaliphatic groups, and lower hydroxyalkyl groups,
- at least two of said  $R_7$ , said  $R_8$ , said  $R_9$ , and said  $R_{10}$ , together with the nitrogen cations to which they are attached, optionally form at least one cationic heterocyclic ring optionally comprising an additional heteroatom other than nitrogen,
- $R_7$ ,  $R_8$ ,  $R_9$ , and  $R_{10}$ , which are identical or different, optionally are each chosen from linear and branched  $C_1$ - $C_6$  alkyl groups substituted with at least one group chosen from nitrile groups, ester groups, acyl groups, amide groups,  $-\text{CO}-\text{O}-\text{R}_{11}-\text{D}$  groups, and  $-\text{CO}-\text{NH}-\text{R}_{11}-\text{D}$  groups, wherein  $\text{R}_{11}$  is chosen from alkylene groups and D is chosen from quaternary ammonium groups,
- $A_1$  and  $B_1$ , which are identical or different, are each chosen from linear and branched, saturated and unsaturated,  $C_2$ - $C_{20}$  polymethylene groups, optionally comprising at least one entity chosen from aromatic rings,



- $X^-$  is an anion,
- said  $A_1$ , said  $R_7$ , and said  $R_9$  optionally form a piperazine ring, together with the two nitrogen cations to which they are attached, and
- provided that if  $A_1$  is chosen from linear and branched, saturated and unsaturated,  $C_2$ - $C_{20}$  polymethylene groups and linear and branched, saturated and unsaturated, hydroxy( $C_2$ - $C_{20}$ )polymethylene groups,  $B_1$  is additionally chosen from
  - ( $CH_2$ ) $_n$ -CO-D-OC-( $CH_2$ ) $_n$ - groups, wherein:
    - $n$  is an integer ranging from 1 to 100, and
    - $D$  is chosen from:

$$\begin{aligned} &-(\text{CH}_2-\text{CH}_2-\text{O})_x-\text{CH}_2-\text{CH}_2- \text{ and} \\ &-\text{[CH}_2-\text{CH}(\text{CH}_3)-\text{O}]_y-\text{CH}_2-\text{CH}(\text{CH}_3)- \end{aligned}$$

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any number ranging from 1 to 4 (in which case x and y represent an average degree of polymerization),

b) bis-secondary diamine residues,

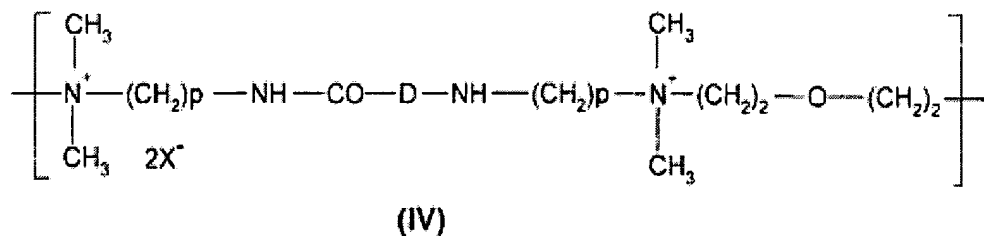
c) bis-primary diamine residues chosen from residues of formula:

-NH-Y-NH-, wherein Y is chosen from linear and branched hydrocarbon groups and residues of formula

-CH<sub>2</sub>-CH<sub>2</sub>-S-S-CH<sub>2</sub>-CH<sub>2</sub>-, and

d) a ureylene group of formula: -NH-CO-NH-;

(3) quaternary diammonium polymers comprising repeating units of formula (IV):



wherein:

- p is an integer ranging from 1 to 6,

- D is chosen from a direct bond and -(CH<sub>2</sub>)<sub>r</sub>-CO- groups, wherein r is a number equal to 4 or 7, and

- X<sup>-</sup> is an anion;

(4) amine-containing silicones, and

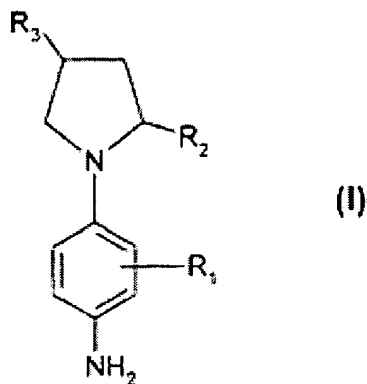
(iii) at least one oxidizing agent,



- 88



of formula (I) and acid addition salts thereof:



wherein:

- R<sub>1</sub> is chosen from a hydrogen atom, C<sub>1</sub>-C<sub>6</sub> alkyl groups, C<sub>1</sub>-C<sub>5</sub> monohydroxyalkyl groups, and C<sub>2</sub>-C<sub>5</sub> polyhydroxyalkyl groups,
- R<sub>2</sub> is chosen from a hydrogen atom, a -CONH<sub>2</sub> group, C<sub>1</sub>-C<sub>5</sub> monohydroxyalkyl groups, and C<sub>2</sub>-C<sub>5</sub> polyhydroxyalkyl groups, and
- R<sub>3</sub> is chosen from a hydrogen atom, and a hydroxyl group,

and optionally comprising:

(ii) at least one cationic polymer chosen from:

- (1) homopolymers and copolymers comprising, as a constituent of the chain, at least one unit chosen from units formula (II):

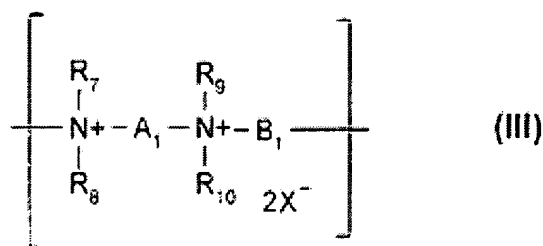




- k and t, which are identical or different, are each chosen from 0 and 1,  
provided that the sum of k + t is equal to 1,
- R<sub>4</sub> and R<sub>5</sub>, which are identical or different, are each chosen from  
(C<sub>1</sub>-C<sub>22</sub>) alkyl groups, (C<sub>1</sub>-C<sub>5</sub>)-hydroxyalkyl groups, and  
(C<sub>1</sub>-C<sub>4</sub>)amidoalkyl groups,
- R<sub>4</sub> and R<sub>5</sub>, together with the nitrogen cation to which they are commonly  
bonded, may optionally form a cationic heterocyclic group chosen from  
a piperidinyl group and a morpholinyl group,
- R<sub>6</sub>, which are identical or different, are each chosen from a hydrogen atom  
and a methyl group, and
- X<sup>-</sup> is an anion;

(2) quaternary diammonium polymers comprising repeating units of formula (III):





wherein:

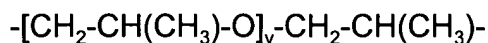
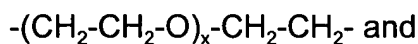
- R<sub>7</sub>, R<sub>8</sub>, R<sub>9</sub>, and R<sub>10</sub>, which are identical or different, are each chosen from C<sub>1</sub>-C<sub>20</sub> aliphatic groups, C<sub>3</sub>-C<sub>20</sub> alicyclic groups, C<sub>7</sub>-C<sub>20</sub> arylaliphatic groups, and lower hydroxyalkyl groups,
- at least two of said R<sub>7</sub>, said R<sub>8</sub>, said R<sub>9</sub>, and said R<sub>10</sub>, together with the nitrogen cations to which they are attached, optionally form at least one cationic heterocyclic ring optionally comprising an additional heteroatom other than nitrogen,
- R<sub>7</sub>, R<sub>8</sub>, R<sub>9</sub>, and R<sub>10</sub>, which are identical or different, optionally are each chosen from linear and branched C<sub>1</sub>-C<sub>6</sub> alkyl groups substituted with at least one group chosen from nitrile groups, ester groups, acyl groups, amide groups, -CO-O-R<sub>11</sub>-D groups, and -CO-NH-R<sub>11</sub>-D groups, wherein R<sub>11</sub> is chosen from alkylene groups and D is chosen from quaternary ammonium groups,
- A<sub>1</sub> and B<sub>1</sub>, which are identical or different, are each chosen from linear and branched, saturated and unsaturated, C<sub>2</sub>-C<sub>20</sub> polymethylene groups, optionally comprising at least one entity chosen from aromatic rings,



an oxygen atom, a sulfur atom, a sulfoxide group, a sulfone group, a disulfide group, an amino group, alkylamino groups, a hydroxyl group, quaternary ammonium groups, a ureido group, an amide group, and ester groups, wherein said at least one entity is linked to or intercalated in the main chain,

- $X^-$  is an anion,
- said  $A_1$ , said  $R_7$ , and said  $R_9$  optionally form a piperazine ring, together with the two nitrogen cations to which they are attached, and
- provided that if  $A_1$  is chosen from linear and branched, saturated and unsaturated,  $C_2$ - $C_{20}$  polymethylene groups and linear and branched, saturated and unsaturated, hydroxy( $C_2$ - $C_{20}$ )polymethylene groups,  $B_1$  is additionally chosen from
  - $-(CH_2)_n-CO-D-OC-(CH_2)_n-$  groups, wherein:
    - $n$  is an integer ranging from 1 to 100, and
    - $D$  is chosen from:

a) glycol residues of formula:  $-O-Z-O-$ , wherein  $Z$  is chosen from linear and branched hydrocarbon groups and groups chosen from groups of formulae:



wherein  $x$  and  $y$ , which are identical or different, are each chosen from integers ranging from 1 to 4 (in which case  $x$  and  $y$  represent a defined and unique degree of polymerization) and



any number ranging from 1 to 4 (in which case x and y represent an average degree of polymerization),

b) bis-secondary diamine residues,

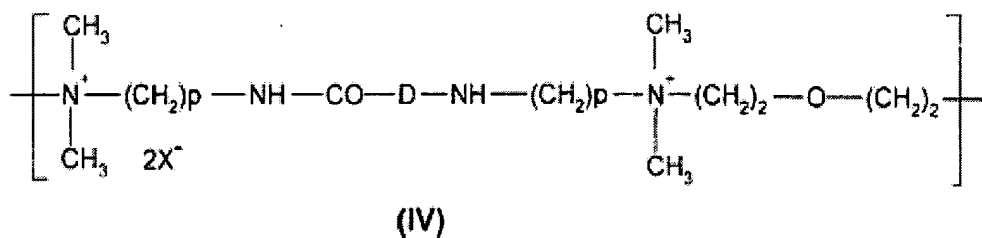
c) bis-primary diamine residues chosen from residues of formula:

-NH-Y-NH-, wherein Y is chosen from linear and branched hydrocarbon groups and residues of formula

-CH<sub>2</sub>-CH<sub>2</sub>-S-S-CH<sub>2</sub>-CH<sub>2</sub>-, and

d) a ureylene group of formula: -NH-CO-NH-;

(3) quaternary diammonium polymers comprising repeating units of formula (IV):



wherein:

- p is an integer ranging from 1 to 6,

- D is chosen from a direct bond and -(CH<sub>2</sub>)<sub>r</sub>-CO- groups, wherein r is a number equal to 4 or 7, and

- X<sup>-</sup> is an anion; and

(4) amine-containing silicones, and



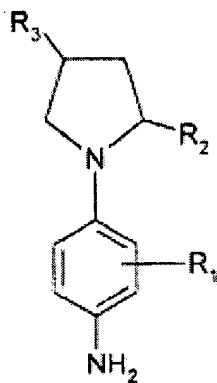
- (B) a second compartment comprises at least one oxidizing agent and optionally comprises said at least one cationic polymer as defined above, and
- (C) provided that said at least one cationic polymer is present in at least one of said first compartment or said second compartment.

49. A kit according to claim 48, wherein said keratinous fibers are human keratinous fibers.

50. A kit according to claim 49, wherein said human keratinous fibers are human hair.

51. A kit for oxidation dyeing keratinous fibers comprising at least three compartments, wherein:

- (A) a first compartment comprises at least one dyeing composition comprising, in a medium suitable for dyeing, at least one oxidation dye precursor chosen from 1-(4-aminophenyl)-pyrrolidines of formula (I) and acid addition salts thereof:



(I)

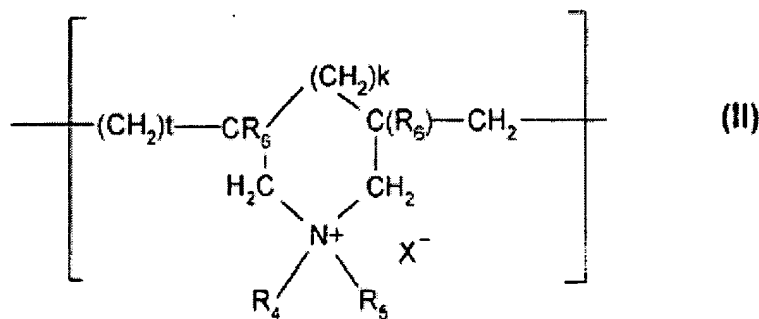


wherein:

- $R_1$  is chosen from a hydrogen atom,  $C_1$ - $C_6$  alkyl groups,  $C_1$ - $C_5$  monohydroxyalkyl groups, and  $C_2$ - $C_5$  polyhydroxyalkyl groups,
- $R_2$  is chosen from a hydrogen atom, a  $-\text{CONH}_2$  group,  $C_1$ - $C_5$  monohydroxyalkyl groups, and  $C_2$ - $C_5$  polyhydroxyalkyl groups, and
- $R_3$  is chosen from a hydrogen atom, and a hydroxyl group,

(B) a second compartment comprises at least one cationic polymer chosen from:

- (1) homopolymers and copolymers comprising, as a constituent of the chain, at least one unit chosen from units formula (II):



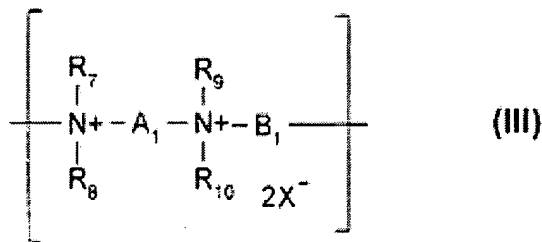
wherein:

- $k$  and  $t$ , which are identical or different, are each chosen from 0 and 1, with the proviso that the sum of  $k + t$  is equal to 1,
- $R_4$  and  $R_5$ , which are identical or different, are each chosen from  $(C_1$ - $C_{22})$  alkyl groups,  $(C_1$ - $C_5)$ -hydroxyalkyl groups, and  $(C_1$ - $C_4)$ amidoalkyl groups,



- $R_4$  and  $R_5$ , together with the nitrogen cation to which they are commonly bonded, may optionally form a cationic heterocyclic group chosen from a piperidinyll group and a morpholinyll group,
- $R_6$ , which are identical or different, are each chosen from a hydrogen atom and a methyl group, and
- $X^-$  is an anion;

(2) quaternary diammonium polymers comprising repeating units of formula (III):



wherein:

- $R_7$ ,  $R_8$ ,  $R_9$ , and  $R_{10}$ , which are identical or different, are each chosen from  $C_1$ - $C_{20}$  aliphatic groups,  $C_3$ - $C_{20}$  alicyclic groups,  $C_7$ - $C_{20}$  arylaliphatic groups, and lower hydroxyalkyl groups,
- at least two of said  $R_7$ , said  $R_8$ , said  $R_9$ , and said  $R_{10}$ , together with the nitrogen cations to which they are attached, optionally form at least one cationic heterocyclic ring optionally comprising an additional heteroatom other than nitrogen,
- $R_7$ ,  $R_8$ ,  $R_9$ , and  $R_{10}$ , which are identical or different, optionally are each

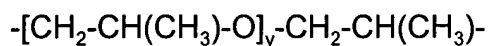
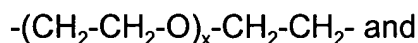


chosen from linear and branched  $C_1$ - $C_6$  alkyl groups substituted with at least one group chosen from nitrile groups, ester groups, acyl groups, amide groups,  $-CO-O-R_{11}-D$  groups, and  $-CO-NH-R_{11}-D$  groups, wherein  $R_{11}$  is chosen from alkylene groups and D is chosen from quaternary ammonium groups,

- $A_1$  and  $B_1$ , which are identical or different, are each chosen from linear and branched, saturated and unsaturated,  $C_2$ - $C_{20}$  polymethylene groups, optionally comprising at least one entity chosen from aromatic rings, an oxygen atom, a sulfur atom, a sulfoxide group, a sulfone group, a disulfide group, an amino group, alkylamino groups, a hydroxyl group, quaternary ammonium groups, a ureido group, an amide group, and ester groups, wherein said at least one entity is linked to or intercalated in the main chain,
- $X^-$  is an anion,
- said  $A_1$ , said  $R_7$ , and said  $R_9$  optionally form a piperazine ring, together with the two nitrogen cations to which they are attached, and
- provided that if  $A_1$  is chosen from linear and branched, saturated and unsaturated,  $C_2$ - $C_{20}$  polymethylene groups and linear and branched, saturated and unsaturated, hydroxy( $C_2$ - $C_{20}$ )polymethylene groups,  $B_1$  is additionally chosen from
  - $-(CH_2)_n-CO-D-OC-(CH_2)_n-$  groups, wherein:
    - n is an integer ranging from 1 to 100, and
    - D is chosen from:



- a) glycol residues of formula:  $-O-Z-O-$ , wherein Z is chosen from linear and branched hydrocarbon groups and groups chosen from groups of formulae:

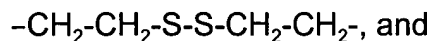


wherein x and y, which are identical or different, are each chosen from integers ranging from 1 to 4 (in which case x and y represent a defined and unique degree of polymerization) and any number ranging from 1 to 4 (in which case x and y represent an average degree of polymerization),

- b) bis-secondary diamine residues,

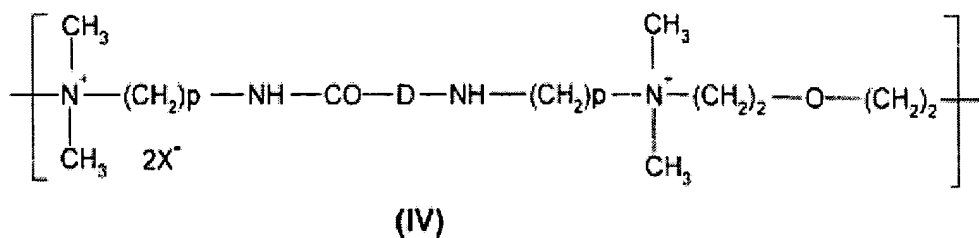
- c) bis-primary diamine residues chosen from residues of formula:

$-NH-Y-NH-$ , wherein Y is chosen from linear and branched hydrocarbon groups and residues of formula



- d) a ureylene group of formula:  $-NH-CO-NH-$ ;

- (3) quaternary diammonium polymers comprising repeating units of formula (IV):





wherein:

- p is an integer ranging from 1 to 6,
- D is chosen from a direct bond and  $-(CH_2)_r-CO-$  groups, wherein r is a number equal to 4 or 7, and
- $X^-$  is an anion; and

(4) amine-containing silicones, and

(C) a third compartment comprises at least one oxidizing agent.

52. A kit according to claim 51, wherein said keratinous fibers are human keratinous fibers.

53. A kit according to claim 52, wherein said human keratinous fibers are human hair.